



Digital
Mining
Center



Wydział Matematyki



The National Centre
for Research and Development

It is a great pleasure to inform you that Faculty of Mathematics (W13) and Faculty of Geoengineering Mining and Geology (W6) received a new research grant from NCBiR (National Center for Research and Development). It is joint initiative. The consortium: AMC Tech company from Krakow, W13 and W6, will work for next 27 months on the project:

A universal diagnostic and prognostic module for condition monitoring systems of complex mechanical structures operating in the presence of non-Gaussian disturbances and variable operating conditions

A key personnel consists of Prof. Agnieszka Wyłomańska (Faculty of Math), prof. Tomasz Barszcz (AMC Tech), prof. Radosław Zimroz (WGGG/KG/DMC). They are leading scientists in the field of applied math, condition monitoring, signal processing, mechanical systems, mining and energy applications.

A budget for WUST is c.a. 1 926 000 PLN (c.a. 421 500 Euro)

Abstract:

The goal of the project is to develop modules for a new class of monitoring/diagnostic systems for complex mechanical systems operating in variable operating load, under non-Gaussian disturbances in diagnostic features space. The project's goal consists of two sub-goals: development of new robust methods for automatic estimation of symptom limit values in the presence of non-Gaussian disturbances, development of modeling methods for long-term data and their use to forecast residual useful life RUL as well as to determine the probability of failure-free operation within a given time horizon. Also IT tools will be developed to automatically assess the quality of the forecast. Adaptation of the current scientific achievements, will be implemented in tasks 2 and 3. Tasks 4-6 are the development of computational algorithms, their implementation, integration with the existing system and testing of proposed solutions at different stages of development. The development of new data processing methods will assume the non-linear relationship between the technical condition and feature value, strong non-stationarity of long-term data and their non-Gaussian behavior. It is necessary to use statistical data modeling, the theory of random processes, description of systems using the theory of stochastic filters, the use of the so-called robust statistics and machine learning methods. The result of the project will be an innovative diagnostic/prognostic system, using the above methods in industrial practice. These methods will be implemented in the own business of the consortium member. The market need to be met is to increase the safety of industrial plants and reduce operating costs through the possibility of implementing and operating systems for monitoring and diagnostics of machines with a module of automatic determination of decision thresholds and a forecasting module. The main target market for the project results are large and medium-sized industrial plants.